

Hazard Profile – Wildland Fire

Summary

- The hazard – Wildland fire burns 17,000 acres of state-owned or protected land annually. The cost of wildland fire on these lands is more than \$28 million annually in firefighting and damage to timber, habitat, and property.
- Previous occurrences – Washington has a long history of both small and very large fires. Some fires can reach 100,000 acres or more, which has occurred seven times since 1902. The state has experienced 26 fires of at least 2,500 acres on state-owned or protected land since 1992. The most recent large fire was Columbia Complex in 2006, which burned 109,402 acres, destroyed 19 homes and outbuildings, and damaged another 31 buildings.
- Probability of future events – Approximately 900 wildland fires occur each year on state-owned or protected land; most are small and less than one acre in size. Approximately 70 percent occur in Eastern Washington. Humans cause most wildland fires. The wildland fire season usually begins in early July and typically culminates in late September, but fires have occurred in every month of the year.
- Jurisdictions at greatest risk – The Washington Department of Natural Resources has identified 199 communities in 34 counties at greatest risk to wildland fire, based on criteria in the wildfire hazard severity analysis developed by the National Fire Protection Association.

Introduction ^{1, 2, 3, 4, 5,}

Wildland fires are fires caused by nature or humans that result in the uncontrolled destruction of forests, brush, field crops, grasslands, and real and personal property.

The wildland fire season in Washington usually begins in early July and typically culminates in late September with a moisture event; however, wildland fires have occurred in every month of the year. Drought, snow pack, and local weather conditions can expand the length of the fire season. The early and late shoulders of the fire season usually are associated with human-caused fires. Lightning generally is the cause of most fires in the peak fire period of July, August and early September.

Short-term loss caused by a wildland fire can include the destruction of timber, wildlife habitat, scenic vistas, and watersheds; vulnerability to flooding increases due to the destruction of watersheds. Long-term effects include smaller timber harvests, reduced access to affected recreational areas, and destruction of cultural and economic resources and community infrastructure.

The Washington Department of Natural Resources protects 2.5 million acres of state-owned land and 10 million acres of land in private ownership through legislative directive [RCW 76.04].

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The department fights about 900 wildland fires per year across the state; about 70 percent are in Eastern Washington. Most are small, usually extinguished while they are less than one acre in size. People start most wildland fires on state lands; major causes include arson, recreational fires that get out of control, smokers' carelessness, debris burning, fireworks and children playing with fire. The major cause of fires on federally protected lands is lightning.

Wildland fires can spread to more than 100,000 acres, depending on a number of factors, and may require thousands of firefighters and several months to extinguish. Federal, state, county, city, and private agencies and private timber companies provide fire protection and firefighting services on forestlands in Washington.

Factors that influence wildland fire⁶

A fire needs three elements in the right combination to start and grow – a heat source, fuel, and oxygen. How a fire behaves primarily depends on the characteristics of available fuel, weather conditions, and terrain; included in this section as a potential source of influence is climate change.

- Fuel:
 - Lighter fuels such as grasses, leaves and needles quickly expel moisture and burn rapidly, while heavier fuels such as tree branches, logs and trunks take longer to warm and ignite.
 - Snags and hazard trees – those that are diseased, dying, or dead – are larger west of the Cascades, but more prolific east of the Cascades. In 2008, approximately 1.36 million acres of the state's 21 million acres of forestland contained trees killed or defoliated by forest insects and diseases.
- Weather:
 - West of the Cascades, strong, dry east winds in late summer and early fall produce extreme fire conditions. East wind events can persist up to 48 hours with wind speed reaching 60 miles per hour; these winds generally reach peak velocities during the night and early morning hours.
 - East of the Cascades, summer drying typically starts in mid June and runs through early September, with drought conditions extending this season. Passage of a dry, cold front through this region can result in sudden increase in wind speeds and a change in wind direction affecting fire spread.
 - Thunderstorm activity, which typically begins in June with wet storms, turns dry with little or no precipitation reaching the ground as the season progresses into July and August. Thunderstorms with dry lightning are more prevalent in Eastern Washington.

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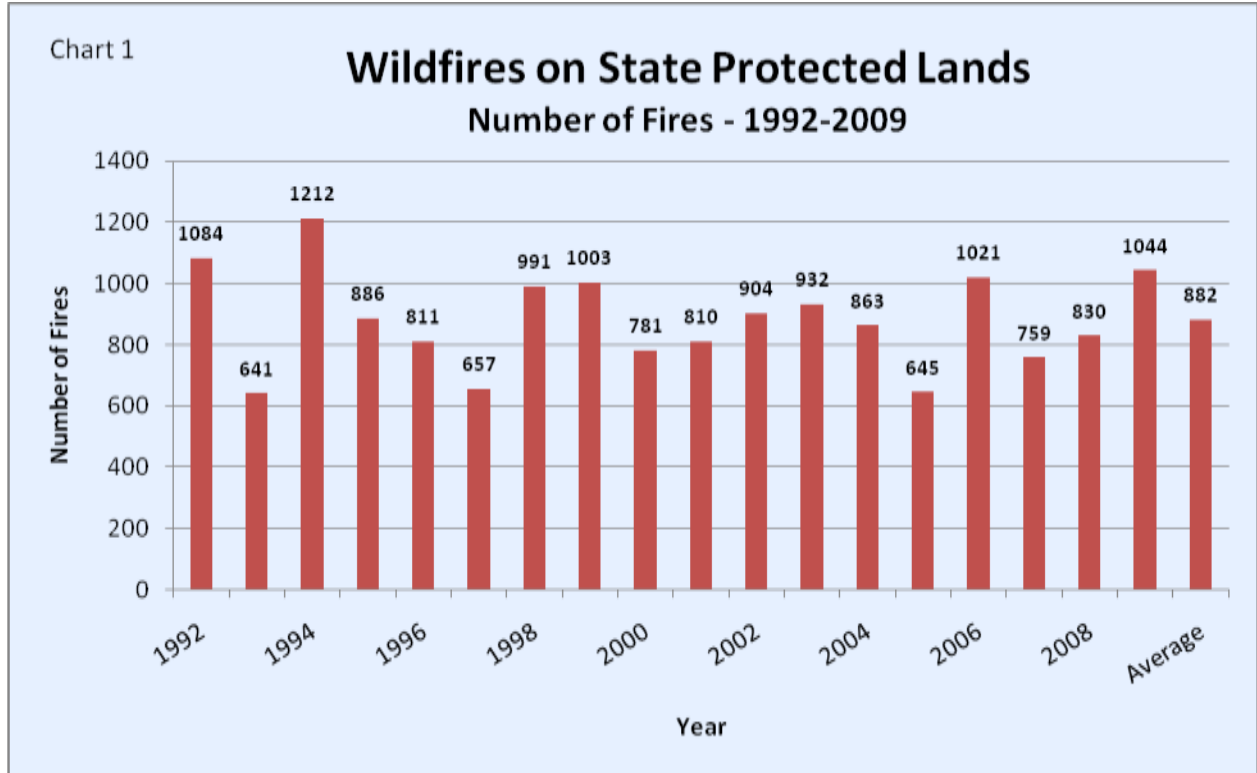
- Terrain:
 - Topography of a region or a local area influences the amount and moisture of fuel.
 - Barriers such as highways and lakes can affect spread of fire.
 - Elevation and slope of landforms – fire spreads more easily as it moves uphill than downhill.
- Climate change:
 - Higher forest fire frequency and intensity likely, especially in eastern WA.
 - Without an increase in summer precipitation (greater than any predicted by climate models), future area burned is very likely to increase. Forests east of the Cascade crest will be most susceptible to larger and more severe fires in a changing climate.
 - Mountain pine beetle poses a significant threat to Washington's pine forests.
 - Although other insect populations may increase with warmer temperatures, the mountain pine beetle poses the greatest threat of damage to Washington forests over the next several decades because it responds directly to warmer temperatures. Eastside forests dominated by lodgepole pine and possibly ponderosa pine, both host species for the beetle, will be most susceptible in a changing climate. Infested tree increase fuel amount.
 - Tree species composition will change as species respond uniquely to a changing climate.
 - Washington state forests most likely to experience major changes in composition in a changing climate will be those near the lower treeline on the east side (ponderosa pine and Douglas-fir) and at the upper treeline on both sides of the Cascade Crest. Productivity of Douglas-fir forests is likely to decrease statewide. This, again, increases fuel amount.

The peak burning period of a fire generally is between 1 p.m. and 6 p.m., with local factors (generally described above) greatly influencing this. Wildland fires can take on a life of their own when there is plenty of heat and fuel. They can create their own winds and weather, generating hurricane force winds of up to 120 miles per hour. Fires can heat fuels in their path, drying them out, and making them easier to ignite and burn.

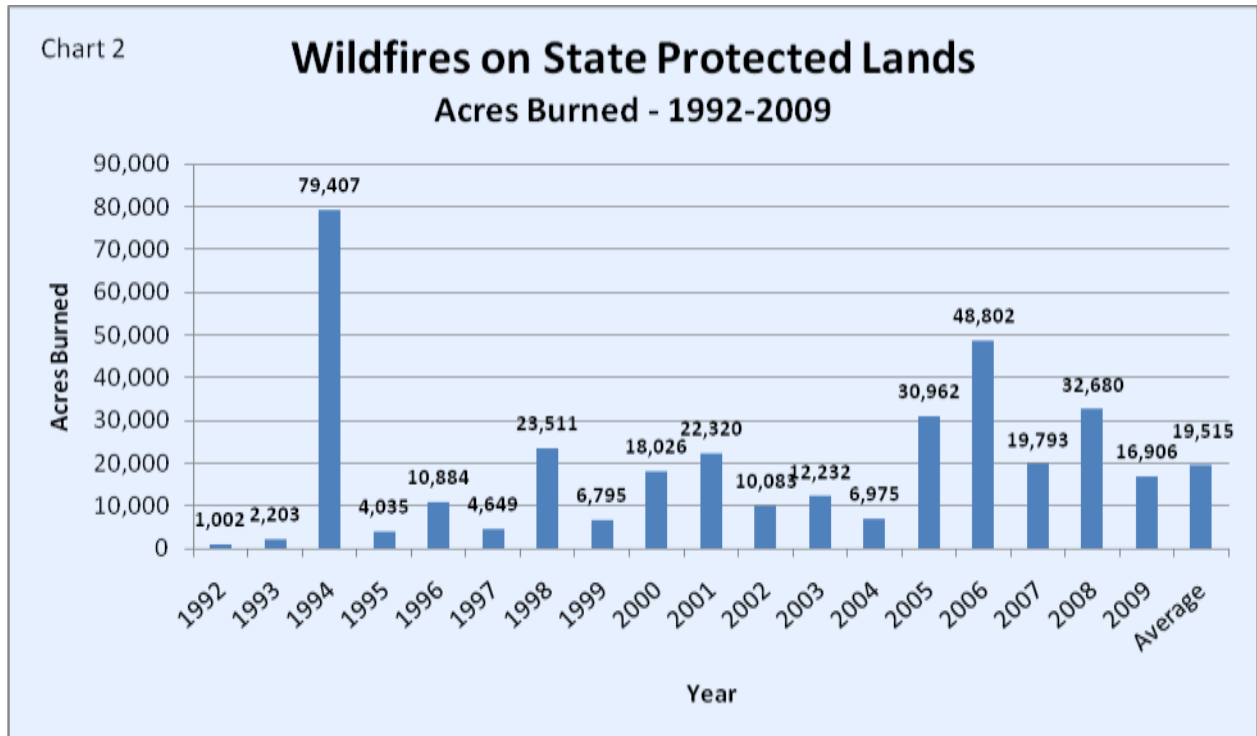
Frequency of Occurrence

Based on figures from 1992 through 2010, about 950 fires have occurred annually on state protected lands (Chart 1), burning about 19,000 acres each year (Chart 2). Human causes account for more than half of the fires each year.

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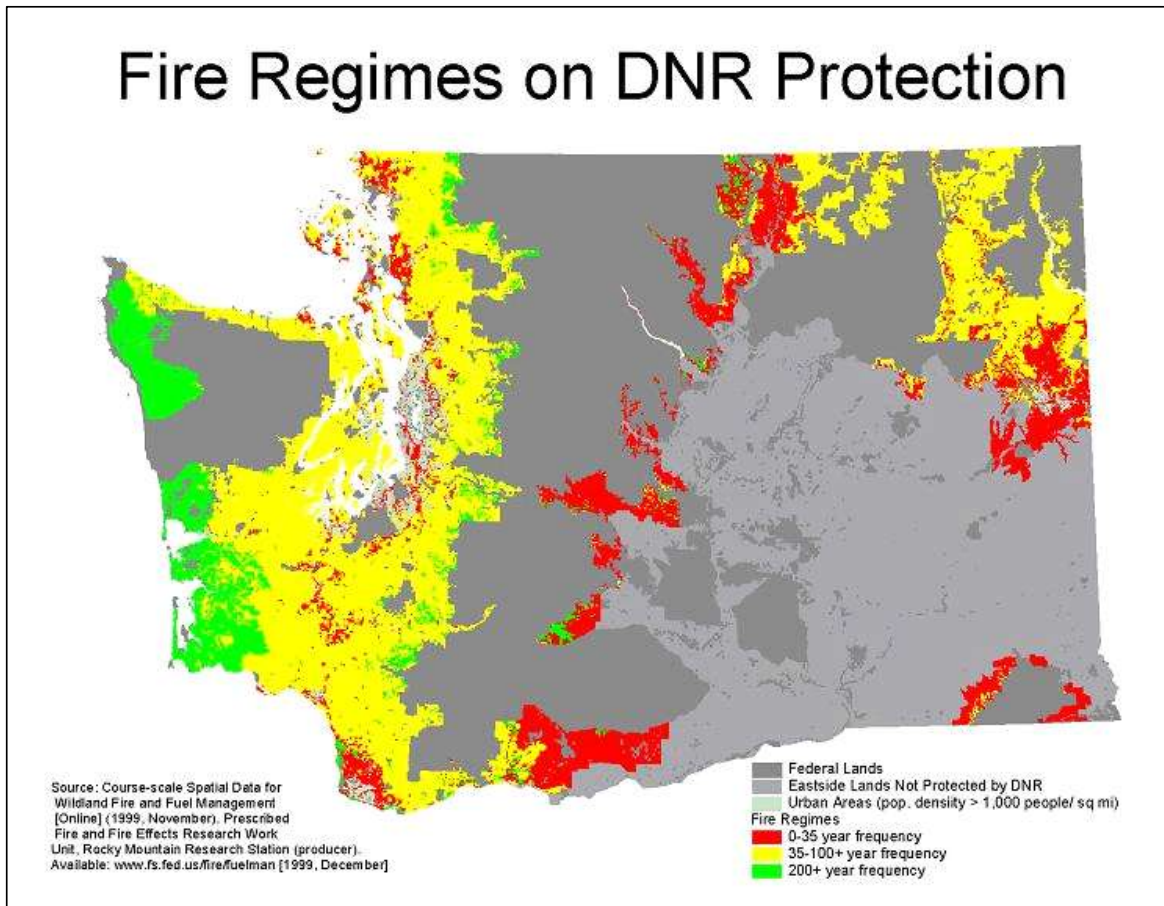
Source: Washington Department of Natural Resources 2010⁷



Source: Washington Department of Natural Resources 2010

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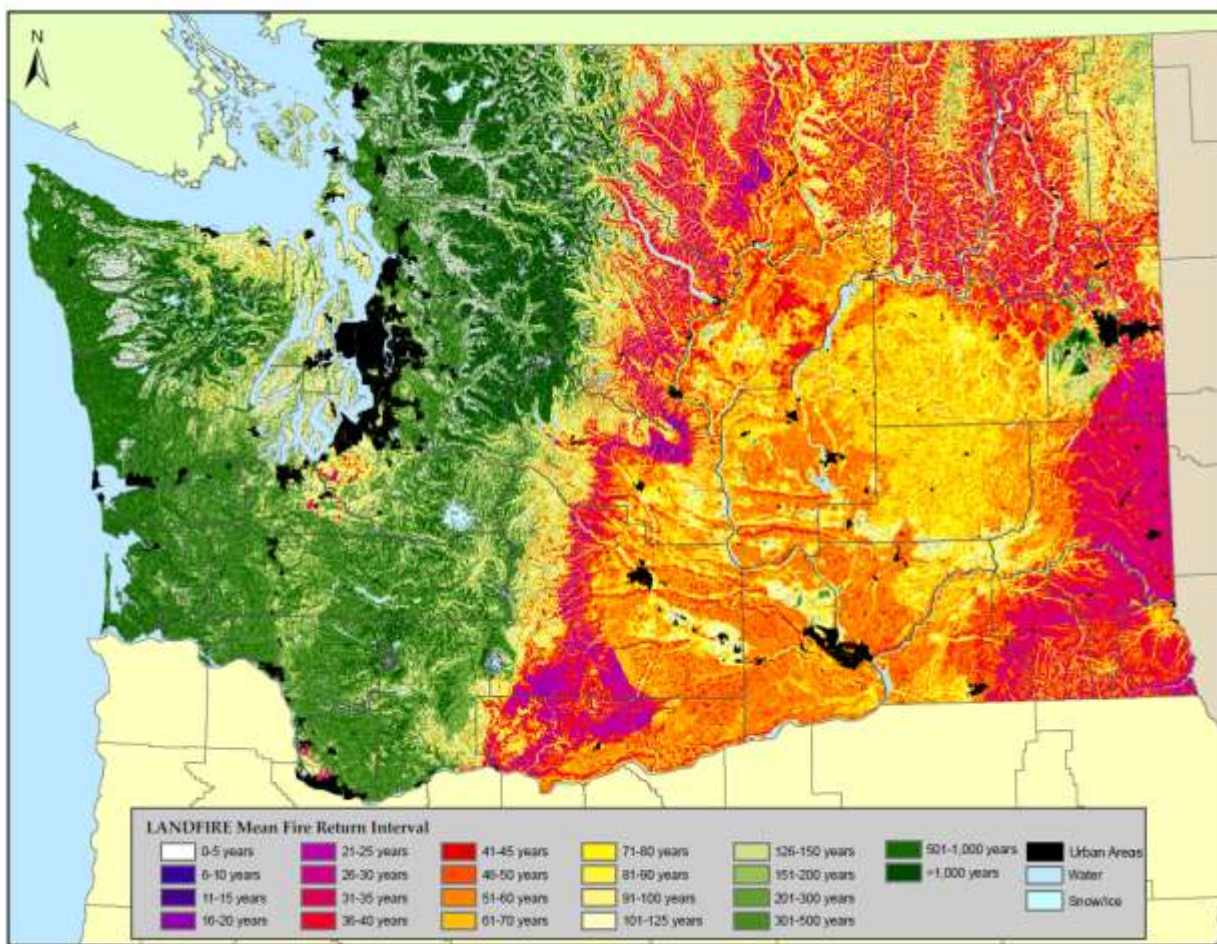
The fire regime map, below, shows fire frequency for state-protected lands in Washington; the map shows wildland fire occurs more frequently in the eastern part of the state.



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Mean Fire Return Interval:⁸

The Mean Fire Return Interval map (below) quantifies the average period between fires under the presumed historical fire regime. This frequency is derived from vegetation and disturbance dynamics simulations using LANDSUM (Keane and others 2002, Hann and others 2004). This layer is intended to represent one component of the presumed historical fire regimes within landscapes based on interactions between vegetation dynamics, fire spread, fire effects, and spatial context.



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Fire Seasons

The wildland fire season in Washington usually begins in early July and typically culminates in late September. The fire season typically is longer in Eastern Washington than in Western Washington; fuel moisture and ignition sources play the most significant roles in the difference.

- The eastern half is drier; the western half of the state receives more rainfall, and has spring seasons that are wetter and cooler than the east.
- Eastern Washington has a larger number of ignition sources, primarily the number of lightning strikes.



Fire Season – June



Fire Season – July



Fire Season – August

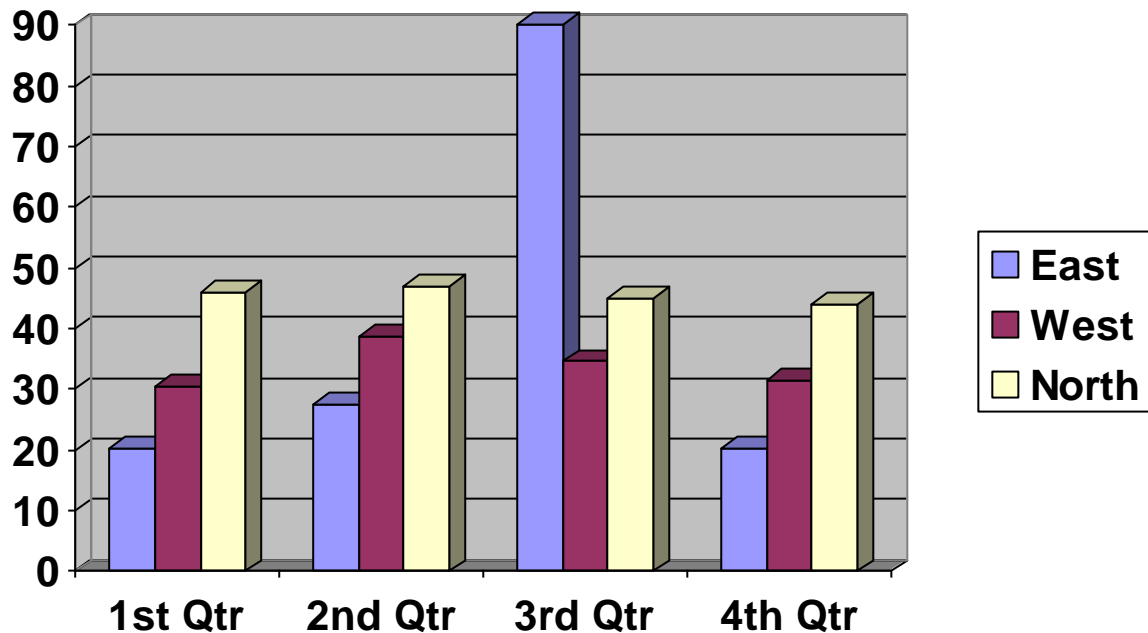


Fire Season – September

Source: Firewise Communities Program / USDA Forest Service⁹

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The graph below is another demonstration of the fire seasons and most impacted regions of Washington.



Impact of Wildland Fire on State-Owned or Protected Land¹⁰

The cost of wildland fire on state-owned or protected lands is more than \$25 million annually in firefighting and damages (based on figures available from the 1992 through 2009 fire seasons, the latest available).

Wildland fires cause about \$9.6 million in damage annually. The bulk of the losses are harvestable timber and timber products valued at more than \$6.8 million. Fire also destroys forage, wildlife, watersheds, recreation areas, and real and personal property valued at more than \$2.8 million.

Data on indirect impacts of wildland fire, such as the economic loss caused by reduced revenue and tax receipts from reduced timber and crop sales or leasing of rangeland, is not available.

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Significant Wildland Fires Since 1900 ^{11, 12, 13, 14, 15, 16}

Table 1, below provides information on some of the most significant wildland fires in Washington since 1900. This includes fires on lands of all ownership – federal, state, local, private, and Indian tribe.

Table 1. Significant Wildland Fires Since 1900

Year	Fire	Area	Acres Burned	Impacts
1902	Yacolt	Skamania, Clark Counties	238,900	38 deaths.
1910	Great Idaho Fire	Spokane and Pend Oreille Counties	150,000	3 million acres burned, mostly in Idaho and Montana; considered one of the nation's historically significant fires.
1929	Dole Valley	Skamania, Clark Counties	227,500	
	Toats Coulee	Okanogan County	80,000	
1951	Great Forks Fire	Clallam County	33,000	Fire threatened Forks leading to evacuation of the town. A sawmill, and a number of homes, cabins and barns destroyed.
1970	Lightning Bust	Chelan, Okanogan Counties	188,000	
1985	Barker Mountain	Okanogan County	60,000	
1987	Hangman Hills	Spokane	1,500	2 deaths; 24 homes destroyed.
1988	Dinkelman	Chelan County	50,000	1 death.
1991	Firestorm 1991	Ferry, Lincoln, Stevens, Pend Oreille, Spokane, and Whitman Counties	35,000	92 fires destroyed 114 homes and 40 buildings, another 250-300 buildings damaged, one death. Fires started by arcing electrical connections, spread over wide area by high winds. Federal Disaster #922. Stafford Act disaster assistance provided: \$12.3 million.
1992	Skookum	Klickitat County	51,000	
1992	Castlerock Canyon	Wenatchee		24 homes destroyed.
1994	Tyee Creek, Hatchery Creek, Rat Creek, Round Mountain	Chelan County	180,000	2,700 homes threatened and evacuated, 37 homes destroyed.

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Table 1. Significant Wildland Fires Since 1900

Year	Fire	Area	Acres Burned	Impacts
1996	Cold Creek	Benton, Yakima Counties	57,000	
2000	24 Command	Hanford Site, Benton County	192,000 (160,000 on Hanford Site)	Caused by vehicle accident, spread to Hanford Site; 36 structures lost. Burned across three radioactive waste disposal sites, no radioactive release detected. Fire came within two miles of 177 underground storage tanks filled with lethal radioactive waste.
	Mule Dry	Yakama Indian Reservation and Yakima, Klickitat, and Benton Counties	76,800	1 home destroyed.
2001	Rex Creek Complex / Virginia Lake Complex	Colville Indian Reservation and Chelan, Ferry, Okanogan Counties	130,000	Hundreds of homes threatened, 10 destroyed.
	Thirtymile	Okanogan	9,300	4 firefighters died.
2002	Deer Point	Chelan County	42,665	5 homes, 4 outbuildings destroyed.
2005	School	Columbia, Garfield counties	52,000	109 homes, 106 outbuildings destroyed; 120 homes, 56 outbuildings threatened. \$15 million suppression costs.
2006	Tripod	Okanogan County	175,184 (11,465 on DNR protection)	
	Spur Peak	Okanogan County	14,000	
	Tin Pan	Chelan County	9,252	
	Columbia Complex	Columbia, Walla Walla	109,402	Lost 11 homes and 8 outbuildings. Damaged 800 homes and 31 outbuildings. Threatened 350 outbuildings.
2007	Easy Street	Chelan County	5,209	Fireworks caused. 1 outbuilding lost. 2150 homes threatened
	Horse Heaven Hills	Benton County	28,575	WFS mobilization fire
	Tunk Grade	Okanogan County	15,540	95 homes threatened

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Table 1. Significant Wildland Fires Since 1900

Year	Fire	Area	Acres Burned	Impacts
2007	Domke Lake	Okanogan Wenatchee Forest	11,900	
	South Omak Lake Fire	Okanogan County	10,500	
	Wautoma	Benton County	67,000	Grass fire on wildlife refuge
	Manila Creek	Colville Reservation Ferry County	26,805	
2008	Badger Mountain	Chelan and Douglas Counties	15,023	Unknown number of homes threatened
	Spokane Valley	Spokane County	1,008	2400 people evacuated, 1900 notified of evacuation. 200 homes threatened, 40 damaged, 12 homes, 14 outbuildings, and 1 communication site destroyed
	Columbia River Road	Okanogan County	22,115	
	Swanson Lake	Lincoln County	19,090	Destroyed 1 abandoned residence, 2 seasonal cabins, and 15 outbuildings
2009	Dry Creek Complex	Yakima County	48,902	Destroyed 1 restaurant, 1 mobile home, and 1 bridge

Major Wildland Fires on State-Owned or Protected Lands, 1992-2009 ^{17, 18, 19}

Table 2, below, provides information on some of the most significant wildland fires on state-owned or protected lands during the latest 16-year period. (Note: List below generally does not include fires referenced above. Acreage burned figures are for state-owned or protected lands only; fires may have burned land under other ownership/protection.)

Table 2. Major Wildland Fires on State Protected Lands, 1992 – 2009

Year	Fire	County/Area	Acres	Impacts
1992	Skookum	Klickitat	2,600 (state protected lands only)	Fire threatened town of Goldendale.
1996	Bowie Road	Spokane	3,020	8 homes destroyed.

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Table 2. Major Wildland Fires on State Protected Lands, 1992 – 2009

Year	Fire	County/Area	Acres	Impacts
1997	Red Lake	Stevens	1,151	5 homes destroyed.
1998	Cleveland	Klickitat	18,500	11 homes destroyed, 143 cattle killed. Several cultural and historic sites and state natural area preserve damaged.
1999	Mallot	Okanogan	2,808	
2000	Alderdale	Klickitat	6,000	
	Rocky Hull	Okanogan	9,404	37 homes destroyed.
	Cayuse	Okanogan	5,460	
	Goodnoe	Klickitat	4,455	Destroyed pastureland, 1 barn.
	Buffalo Lake	Colville Indian Reservation	9,300	
	Wood Gulch	Klickitat	2,620	
2001	Libby	Okanogan	3,830	50 structures threatened, none lost.
	Spruce/Dome Complex	Yakima	2,442	
	Brewster Complex	Okanogan	6,154	
	Union Valley	Chelan	4,700	100 structures threatened, 3 destroyed.
	North Coppei	Columbia	4,810	
2002	Deer Mountain	Chelan	2,281	
2004	Mud Lake		4,000	
	Pot Peak-Sisi Ridge	Chelan	47,170	
2005	Dirty Face	Chelan	1,150	\$6.7 million suppression costs.
	Second HUDS	Okanagon	4,274	\$2 million suppression costs.
	West Omak Lake	Okanagon	11,325	\$2 million suppression costs.
	Wood Gulch	Klickitat	5,400	\$500,000 suppression costs.
2006	Columbia Complex	Columbia, Walla Walla	109,402	Lost 11 homes and 8 outbuildings. Damaged 800 homes and 31 outbuildings. Threatened 350 outbuildings.
	Tripod Complex	Okanogan County	175,184 (11,465 on DNR protection)	
2007	Easy Street	Chelan County	5,209	Caused by Fireworks. 1 outbuilding lots; 2,150 homes threatened.

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Table 2. Major Wildland Fires on State Protected Lands, 1992 – 2009

Year	Fire	County/Area	Acres	Impacts
2009	Tunk Grade	Okanogan County	15,540	95 homes threatened
	Discovery	Yakima County	4,120 (3,572 on DNR protection)	
	Oden Road	Okanogan County	9,607	Destroyed 2 homes and 12 outbuildings. Threatened 91 permanent residences
	Union Valley	Chelan County	770	Threatened 120-140 homes and 75 people were evacuated

Jurisdictions Most Vulnerable to Wildland Fire²⁰

The State Forester designated 199 Wildfire-Urban Interface Communities as being at high risk to wildfire. A map (page 15) and list of designated communities (page 14) follow; the red shaded area of the map depicts at-risk areas by zip code.

The Washington Department of Natural Resources and its federal and local partners determined the listed communities are at high risk after evaluating them for fire behavior potential, fire protection capability, and risk to social, cultural and community resources. Risk factors included area fire history, type and density of vegetative fuels, extreme weather conditions, topography, number and density of structures and their distance from fuels, location of municipal watershed, and likely loss of housing or business. The evaluation used the criteria in the wildfire hazard severity analysis of the National Fire Protection Association's NFPA 299 Standard for Protection of Life and Property from Wildfire.

The counties in which these jurisdictions lie are:

Asotin	Chelan	Clallam	Clark	Columbia	Cowlitz	Ferry
Garfield	Island	King	Kitsap	Kittitas	Klickitat	Lewis
Mason	Okanogan	Pend Oreille	Pierce	San Juan	Skagit	Skamania
Snohomish	Spokane	Stevens	Thurston	Walla Walla	Whatcom	Yakima

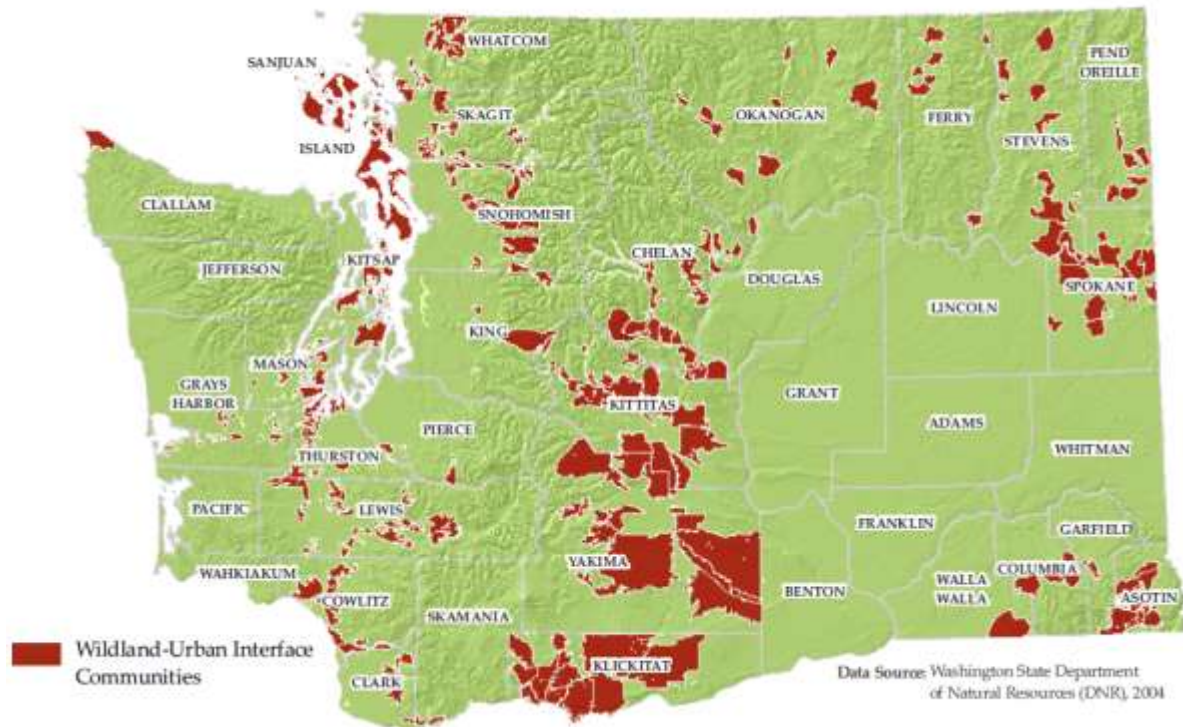
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Urban Interface Communities at High Risk to Wildfire

12 Mile	Entiat	Lopez	Ridge at Hangman
7 Mile	Enumclaw	Lower Lake Cle E	Rimrock
Aeneas Valley	Fertile Valley	Lower Lake Keech	Robinette
Ahtanum	Fidalgo	Lower Valley Nor	Rochester
Alta Lake	Field Spring	Lower Valley Riv	Rockport
Amboy	Finley-Dry Gulch	Lower Valley Sou	Roy-McKenna
Asotin Creek	Flowery Trail	Lower Wenas	Salmon LaSac
Aspen Meadows	Foothills	Lummi	Samish
Bakers Pond	Ford	Makah	San Juan
Beacon Hill	Four Mounds	Malloy Praire	Shaw
Bead Lake	Furport	Malo East	Skamania
Belle Vista	Geiger	Maloney Mountain	Skykomish
Ben Howard	Glacier	Manastash	Snoqualmie
Big Lake	Glenoma	Marblemount	Snowblaze
Blewett	Glenwood	Marshall	Snowden
Brender Canyon	Grande Ronde	Martin/Mossy	South Skagit
Burnt Valley	Green Canyon	Mason	Springdale
BZCorners	Greenwater	Mazama	Squilchuck
Cabin Creek	Grouse Flats	Mccoy Flats	Steamboat Island
Camano	Guemis	Midway	Stemilt
Capitol Forest	Haward	Mill Creek	Stevenson
Carlton	Herron Creek	Mission Creek	Suncrest
Carnation	High Prairie	Montesano	Teanaway
Castle Rock	Highway 410	Mount Hull	Teanaway2
Centralia Alpha	Hockinson	Moxee	Tenino
Chewelah Golf Co	Icicle Creek	Mt. Loop	Terrace Heights
Chiliwist	Index	Mtn Home Rd	Trout Creek
Chuckanut Mtn.	Jim Creek	Mullen Hill	Trout Lake
Chumstick	Johnson Point	National	Tum Tum
Cinebar	Jump Off	Navarre Coulee	Union Valley
Clayton	Kalama	Newman Lake	Upper Nason Crk.
Cle Elem	Kalispell Reserv	Nooksack	Upper Wenas
Cloverland	Kelly Hill	North Bend	Waitsburg
Colockum	Kelso	NW Goldendale	Waitts Lake
Conconully	Kendall	Onion Creek	Washougal
Concrete	Kettle Falls	Orcas	Washougal River
Cooper Point	Kitsap	Orient	West Grays
Cowiche	Klickitat East	Oso/Cavanaugh	West Lewis
Coyote Trail	Klickitat Heights	Outer Islands	West Wenatchee
Crumbacher	Klickitat Valley	Painted Hills	Whatcom
Curlew	Lake Chelan	Park Road	Whidbey
Darrington/Sauk	Lake Kachness	Peoh Point	White River
Deer Lake	Lake Lawrence	Peshastin Creek	White Salmon
Dennison Chattar	Lake Wenatchee	Plain	White Swan
Devil Mtn.	Liberty	Pleasant Prairie	Winlock
Diamond Lake	Liberty Lake	Ponderosa	Winthrop
East Ellensburg	Longview	Porter	Woodland
Elk Heights	Lookout Mtn	Reecer	Yacolt
Ellensburg Pass	Loomis	Rendevous	Yakima Canyon
Enterprise	Loon Lake	Republic	

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Wildland-Urban Interface Communities



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As of May 2009, Washington State currently has 35 Firewise Communities listed below.

Alaska Place, Friday Harbor, 2004	Lake Cushman, Hoodspport, 2006	Shelter Bay, La Conner, 2005
Brown Island, Friday Harbor, 2006	Leeward Road, Friday Harbor, 2008	Skagitwilde, Concrete, 2007
Cape San Juan Commission, Friday Harbor, 2007	Lummi Island Scenic Estates, Lummi Island, 2003	South Cady Mountain, Friday Harbor, 2007
Carefree Area, Friday Harbor, 2008	Misty Isle, Friday Harbor, 2007	The North Forty, Friday Harbor, 2007
Cattle Point Estates, Friday Harbor, 2004	Mitchell Point, Friday Harbor, 2004	Three Meadows, Friday Harbor, 2006
Chuckanut Ridge POA, Blanchard, 2003	Mt. Dallas, Friday Harbor, 2005	Timber Lane, Friday Harbor, 2009
Colony Surf Club Inc., Lilliwaup, 2007	Mullen Hill Terrace Mobile Home Park, Spokane, 2006	Tolt Triangle Fire Council, Carnation, 2005
Hannah Heights, Friday Harbor, 2009	Orcas Highlands, East Sound, 2005	Westside Story, Friday Harbor, 2007
Hartstene Pointe, Shelton, 2005	Ponderosa Park, Goldendale, 2008	Westview Woods, Eastsound, 2009
High Haro Road, Friday Harbor, 2008	Primrose, Friday Harbor, 2008	Wold Road South, Friday Harbor, 2009
Hillview Terrace II, Friday Harbor, 2007	River Bluff Ranch, Spokane, 2002	Yacht Haven Area, Friday Harbor, 2008
Hillview Terrace III, Friday Harbor, 2007	Roche Harbor, Roche Harbor, 2004	

At-Risk State Agency Facilities

State Agency facilities identified as being at-risk to wildland fire (see table, page17) were determined using geo-spacial software to match their location to the wildland fire-urban interface hazard zone, represented on the above map.

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State Agency Structures At Risk

VULNERABILITY ASSESSMENT



Wildland-Urban Interface (WUI):

	# of Facilities	Total Original Cost	Avg. Original Cost	Total Square Feet	Average Sq. Ft.
Owned:	943	\$172,244,586	\$182,655	3,019,014	3,201
	# of Essential Facilities	Total Original Cost	Avg. Original Cost	Total Square Feet	Average Sq. Ft.
	194	\$133,005,845	\$685,597	1,752,206	9,031
	# of Facilities	Total Monthly Rent	Avg. Monthly Rent	Total Square Feet	Average Sq. Ft.
Leased:	35	\$178,910	\$5,111	145,741	4,164
	# of Essential Facilities	Total Monthly Rent	Avg. Monthly Rent	Total Square Feet	Average Sq. Ft.
	4	\$14,369	\$3,592	14,176	3,544

State owned structures within hazard zone:

Function of at-risk buildings: Included in the state facilities potentially at-risk to wildland fires in the urban interface are the following:

- University of Washington's Big Beef Creek Laboratory and Friday Harbor Marine Laboratory.
- Communication towers and facilities of the Washington Departments of Natural Resources, Transportation, and State Patrol.
- Ferry terminals at Southworth, Bremerton, Clinton, Keystone, Lopez Island, and Friday Harbor, and a variety of vehicle maintenance, storage and other facilities of the Department of Transportation.
- Lewis River, Tucannon, Mossyrock, Methow, Marblemount, and Arlington fish hatcheries, and facilities at a variety of wildlife and fishing access areas belonging to the Department of Fish and Wildlife.
- Campus of Echo Glen Children's Center for juvenile offenders.
- Grandview and Toppenish armories of the State Military Department
- The Washington Veteran's Home in Retsil.
- Picnic, comfort, shelter and other facilities at more than 30 parks operated by the State Parks and Recreation Commission.

State critical facilities at risk within hazard zone:

Function of at-risk critical facilities: Included in the state facilities potentially at-risk to wildland fires in the urban interface are the following:

- Lighthouses at Fort Casey and Limekiln State Parks.
- Pump houses, chemical storage, emergency generators and other facilities at state parks, state fish hatcheries, and transportation department installations statewide.
- Communication towers and facilities of the Washington Departments of Natural Resources, Transportation, and State Patrol.
- Campus of Echo Glen Children's Center for juvenile offenders.

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¹ *Washington State 2001 Hazard Identification and Vulnerability Assessment*, Washington State Military Department, Emergency Management Division, April 2001.

² Untitled document in *The Winning Series* describing the fuels, strategy, tactics, special safety and logistical concerns in the Pacific Northwest, Wildfire Lessons Learned Center, National Wildfire Coordinating Group, <http://www.wildfirelessons.net/Winning_Series.htm>, (April 2009).

³ Washington Department of Natural Resources, annual fire statistics, 1992 – 2009.

⁴ *Washington Forest Health Issues in 2005*, Washington Department of Natural Resources, <<http://www.dnr.wa.gov/htdocs/rp/forhealth/2005highlights/fhresultsinter.html>>, (July 14, 2006).

⁵ Oral communication from Bob Bannon, Natural Resource Program Section Administrator, Resource Protection Division, Washington Department of Natural Resources, August 1, 2003.

⁶ Reeder, Spencer (Nov. 6, 2008). Presentation at the Emergency Management Council.

⁷ Department of Natural Resources Emergency Incident Response System and Fire Statistics databases, February 19, 2010.

⁸ Landfire™ National Map. *Mean Fire Return Intervals*. Undated. Accessed: 29 May 2009. Available at: <http://www.landfire.gov>

⁹ Firewise Communities, http://www.firewise.org/resources/peak_fire_seasona_index.html, (July 12, 2006).

¹⁰ Washington Department of Natural Resources, annual fire statistics, 1992 – 2008

¹¹ Ibid.

¹² *Washington Wildfire Mitigation Plan*, Washington Department of Community Development and Washington Department of Natural Resources, May 1994.

¹³ *Firestorm '91 And Wind Mitigation Survey Report, FEMA-922-DR-WA*, Washington Department of Community Development and Washington Department of Natural Resources, November 1992.

¹⁴ Washington State Emergency Operation Center incident records, Washington Emergency Management Division, 1994 – 2001.

¹⁵ Written communication from Paul Hampton, Resource Protection Division, Washington Department of Natural Resources, November 17, 2003.

¹⁶ *DNR Resource Protection Program 2005 Summary*, Washington Department of Natural Resources, March 2, 2006.

¹⁷ Washington State Emergency Operation Center incident records, Washington Emergency Management Division, 1994 – 2009.

¹⁸ Washington Department of Natural Resources, annual fire statistics, 1992 – 2009

¹⁹ *DNR Resource Protection Program 2005 Summary*, Washington Department of Natural Resources, March 2, 2006.

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²⁰ Originally published in *Federal Register*, Volume 66, Number 100, pages 43432-43433, August 17, 2001, and updated by the Washington Department of Natural Resources in *A Progress Report on The National Fire Plan in Washington*, 2002. List Revised, 2004, 2009.